

Application No. 09/856,384
Applicants: K. Motegi et al.

Amendments to the Claims:

This Listing of Claims will replace all prior versions, and listings, of claims in the application.

Listing of the Claims:

Claim 1 (Currently amended): An optical apparatus including ~~an airtight chamber at least one barrel~~ for accommodating optical elements, the optical apparatus comprising:

a chamber which accommodates said barrel;

a first purge mechanism provided with said ~~airtight chamber~~ barrel to supply a first gas into said ~~airtight chamber~~ barrel;

a second purge mechanism provided with said ~~airtight chamber~~ barrel to supply a second gas having a composition differing from the first gas into said ~~airtight chamber~~ barrel;

an operation condition detecting mechanism ~~adapted to said optical apparatus disposed in said chamber~~ to detect ~~an operation condition of said optical apparatus~~ the concentration of a predetermined gas inside said chamber; and

a control apparatus connected to said first purge mechanism, ~~[[and]]~~ said second purge mechanism and said operation condition detecting mechanism to selectively connect said ~~airtight chamber~~ barrel to said first purge mechanism or said second purge mechanism based on a detection result of the operation condition detecting mechanism.

Claim 2 (Previously presented): An optical apparatus as claimed in claim 1, further comprising a light source which emits illumination light.

Claim 3 (Previously presented): An optical apparatus as claimed in claim 2, wherein said light source includes an excimer laser light source which emits excimer laser light.

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Claim 4 (Currently amended): An optical apparatus as claimed in claim 1, further comprising an illumination optical system having a plurality of optical elements and illuminating a mask with illumination light, wherein at least some of said plurality of optical elements of the illumination optical system are accommodated in said ~~airtight chamber~~ barrel.

Claim 5 (Previously presented): An optical apparatus as claimed in claim 4, further comprising a projection optical system that projects at least part of a pattern formed on said mask onto a substrate.

Claim 6 (Previously presented): An optical apparatus as claimed in claim 1, wherein said first gas is inert gas, and said second gas is oxygen, which has at least the same concentration as that in the atmosphere, or mixed gas, which contains oxygen.

Claim 7 (Previously presented): An optical apparatus as claimed in claim 6, further comprising a cleaning apparatus arranged in a flow path of the first gas and the second gas to remove impurities from the gases.

Claim 8 (Currently amended): An optical apparatus as claimed in claim 1, wherein ~~said optical apparatus includes a housing which accommodates said airtight chamber,~~ said operation condition detecting mechanism includes an environment monitor ~~which detects the concentration of a predetermined gas inside or outside said housing,~~ and said control apparatus switches the purge mechanism connected to said ~~airtight chamber~~ barrel from the first purge mechanism to the second purge mechanism based on the detection results of the environment monitor when the concentration of said predetermined gas falls below a predetermined value.

Claim 9 (Currently amended): An optical apparatus ~~as claimed in claim 1, wherein~~ ~~said optical apparatus includes~~ further comprising an exhaust apparatus connected to said ~~airtight chamber~~ barrel; ~~said operation condition detecting mechanism includes~~

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and an exhaust monitor provided with said exhaust apparatus to detect the exhaust volume of said exhaust apparatus, ~~and~~ wherein said control apparatus switches the purge mechanism connected to said ~~airtight chamber~~ barrel from the first purge mechanism to the second purge mechanism based on the detection results of the ~~environment~~ exhaust monitor when said exhaust volume falls below a predetermined value.

Claim 10 (Canceled)

Claim 11 (Canceled)

Claim 12 (Currently amended): An optical apparatus as claimed in claim [[11]] 1, wherein said second purge mechanism is connected to the ~~airtight chamber~~ barrel when part of the ~~housing accommodating said airtight chamber~~ is in an opened state, when a power supply of said optical apparatus is off, or when said optical apparatus is being transported, assembled, or adjusted.

Claim 13 (Previously presented): An optical apparatus as claimed in claim 1 further comprising a holder that stores and holds said second gas.

Claim 14 (Currently amended): An exposure apparatus that transfers a pattern of a mask to a substrate, the exposure apparatus comprising:
a light source which emits illumination light;
~~an airtight chamber~~ a barrel accommodating at least one of a plurality of optical elements disposed between said light source and said substrate;
a chamber which accommodates said barrel;
a first purge mechanism provided with said ~~airtight chamber~~ barrel to supply a first gas into said ~~airtight chamber~~ barrel;

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a second purge mechanism provided with said ~~airtight chamber~~ barrel to supply a second gas having a composition differing from said first gas into said ~~airtight chamber~~;

an operation condition detecting mechanism ~~adapted to said exposure apparatus disposed in said chamber to detect an operation condition of said exposure apparatus~~ the concentration of a predetermined gas inside said chamber; and

a control apparatus connected to said first purge mechanism, ~~[[and]]~~ said second purge mechanism and said operation condition detecting mechanism to selectively connect said ~~airtight chamber~~ barrel to said first purge mechanism or said second purge mechanism based on a detection result of the operation condition detecting mechanism.

Claim 15 (Currently amended): An exposure apparatus as claimed in claim 14, wherein said ~~airtight chamber includes~~ barrel is one of a first ~~airtight chamber~~ barrel which accommodates the optical elements in said light source, a second ~~airtight chamber~~ barrel which accommodates at least one of the optical elements disposed between said light source and said mask, and a third ~~airtight chamber~~ barrel which accommodates at least one of the optical elements disposed between said mask and said substrate.

Claim 16 (Currently amended): An exposure apparatus as claimed in claim 14, further comprising a recovering apparatus that recovers said first gas through at least one of the housing chamber accommodating said ~~airtight chamber~~ barrel and said ~~airtight chamber~~ barrel.

Claim 17 (Previously presented): An exposure apparatus as claimed in claim 15, wherein said second gas is chemically clean dry air.

Claim 18 (Canceled)

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Claim 19 (Canceled)

Claim 20 (Currently amended): An exposure apparatus as claimed in claim [[19]] 15, ~~wherein said airtight chamber includes a plurality of airtight chambers disposed in a light path of said illumination light, further comprising~~ a plurality of sensors are provided in each of said plurality of ~~airtight chambers~~ barrels, and ~~wherein~~ said light emission control apparatus controls said light source based on outputs of said plurality of sensors.

Claim 21 (Currently amended): An exposure apparatus as claimed in claim [[20]] 14, further comprising an illumination optical system illuminating said mask with said illumination light, a projection optical system projecting at least part of said mask pattern, which is illuminated with said illumination light, onto said substrate, and a transmission system disposed between said light source and said illumination optical system, wherein ~~said plurality of airtight chambers includes at least one of a first airtight chamber provided in said light source, a second airtight chamber accommodating at least one of optical elements forming said illumination optical system, a third airtight chamber accommodating at least one of optical elements forming said projection optical system, and a fourth airtight chamber accommodating at least one of optical elements forming said transmission system~~ said barrel is configured as part of said illumination optical system, said projection optical system, or said transmission system.

Claim 22 (Canceled)

Claim 23 (Canceled)

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Claim 24 (Currently amended): An exposure apparatus as claimed in claim ~~[[23]]~~ 14, further comprising ~~a housing which accommodates said airtight chamber and an exhaust apparatus connected to said housing~~ chamber and operated when said second gas is supplied.

Claim 25 (Currently amended): An exposure apparatus as claimed in claim 24, ~~further comprising an environment sensor provided with said housing to detect the environment in said housing;~~ wherein said exhaust apparatus is controlled based on an output of said ~~environment sensor~~ operation condition detecting mechanism.

Claim 26 (Canceled)

Claim 27 (Withdrawn): A laser light source used in an exposure apparatus that transfers a pattern of a mask onto a substrate, the laser light source comprising:
a tank which stores a second gas, which has a composition differing from a first gas that is supplied during the operation of said exposure apparatus; and
piping connected to the laser light source to introduce said second gas into the laser light source when the laser light source is separated from said exposure apparatus.

Claim 28 (Withdrawn): A gas supply method for supplying a predetermined gas to an airtight chamber, which accommodates optical elements and is disposed in an optical apparatus, the gas supply method comprising the steps of:
detecting an operation condition of said optical apparatus;
selectively supplying the airtight chamber with a first gas or a second gas, the composition of which differs from the first gas, as said predetermined gas based on the detection result.

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Claim 29 (Withdrawn): A gas supply method as claimed in claim 28, wherein said first gas is inert gas, and said second gas is oxygen, which has at least the same concentration as that in the atmosphere, or mixed gas, which contains oxygen.

Claim 30 (Withdrawn): A gas supply method as claimed in claim 29, wherein said optical apparatus includes a housing accommodating said airtight chamber, the gas concentration in the inside or outside of said housing is detected, and, based on the results of the detection, said first gas is supplied to said airtight chamber when said gas concentration exceeds a predetermined value, and said second gas is supplied to the airtight chamber when said gas concentration falls below said predetermined value.

Claim 31 (Withdrawn): A gas supply method as claimed in claim 29, wherein said optical apparatus includes an exhaust apparatus connected to said airtight chamber, the gas supply method comprising the steps of:

- detecting an exhaust volume of said exhaust apparatus; and
- supplying said first gas to said airtight chamber when said exhaust volume is greater than or equal to a predetermined value, and supplying said second gas to said airtight chamber when the gas concentration falls below said predetermined value.

Claim 32 (Withdrawn): A gas supply method as claimed in claim 29, wherein said first gas is supplied to said airtight chamber when said optical apparatus is operated.

Claim 33 (Withdrawn): A gas supply method as claimed in claim 32, wherein said second gas is supplied to said airtight chamber when said airtight chamber or part of a housing accommodating the airtight chamber is opened or when a power supply of the optical apparatus is off.

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Claim 34 (Withdrawn): A gas supply method as claimed in claim 29, wherein said optical apparatus includes an illumination optical system which illuminates a mask with illumination light from a light source, a projection optical system which projects at least part of a pattern of the mask illuminated with said illumination light onto a photosensitive substrate, and a transmission system disposed between said light source and said illumination optical system, wherein said airtight chamber is provided in at least one of said illumination optical system, said projection optical system, and said transmission system.

Claim 35 (Withdrawn): An exposure method comprising the step of:
projecting a pattern of a mask onto a substrate using a gas supply method for supplying a predetermined gas to an airtight chamber, which accommodates optical elements and is disposed in an optical apparatus, the gas supply method including the steps of:

- detecting an operation condition of said optical apparatus; and
- selectively supplying the airtight chamber with a first gas or a second gas, the composition of which differs from the first gas, as said predetermined gas based on the detection result.

Claim 36 (Withdrawn): An exposure method for projecting a pattern formed on a mask onto a substrate, the exposure method comprising the step of:
supplying a first gas to said airtight chamber using the gas supply method for supplying a predetermined gas to an airtight chamber, which accommodates optical elements and is disposed in an optical apparatus before projecting said pattern onto said substrate, the gas supply method including the steps of:

- detecting an operation condition of said optical apparatus; and
- selectively supplying the airtight chamber with a first gas or a second gas, the composition of which differs from the first gas, as said predetermined gas based on the detection result, wherein said first gas is inert gas, and said second gas is oxygen, which has at least the same concentration as that in the atmosphere,

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or mixed gas, which contains oxygen, and wherein said first gas is supplied to said airtight chamber when said optical apparatus is operated.

Claim 37 (Withdrawn): A device manufacturing method comprising the steps of: supplying a first gas to said airtight chamber using the gas supply method; and projecting a pattern formed on a mask onto a substrate, the gas supply method including the steps of:

- detecting an operation condition of said optical apparatus; and
- selectively supplying the airtight chamber with a first gas or a second gas, the composition of which differs from the first gas, as said predetermined gas based on the detection result, wherein said first gas is inert gas, and said second gas is oxygen, which has at least the same concentration as that in the atmosphere, or mixed gas, which contains oxygen, and wherein said first gas is supplied to said airtight chamber when said optical apparatus is operated.

Claim 38 (New): An optical apparatus including at least one barrel for accommodating optical elements, the optical apparatus comprising:

- a chamber which accommodates said barrel;
- a first purge mechanism provided with said barrel to supply a first gas into said barrel;
- a second purge mechanism provided with said barrel to supply a second gas having a composition differing from the first gas into said barrel;
- an exhaust apparatus connected to said chamber;
- an exhaust monitor provided with said exhaust apparatus to detect the exhaust volume of said exhaust apparatus; and
- a control apparatus connected to said first purge mechanism, said second purge mechanism and said exhaust monitor to selectively connect said barrel to said first purge mechanism or said second purge mechanism based on a detection result of said exhaust monitor.

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Claim 39 (New): An optical apparatus as claimed in claim 38, further comprising an operation condition detecting mechanism disposed in said chamber to detect the concentration of a predetermined gas inside said chamber, wherein said control apparatus selectively connects said barrel to said first purge mechanism or said second purge mechanism based on a detection result of the operation condition detecting mechanism.

Claim 40 (New): An optical apparatus as claimed in claim 38, said control apparatus switches the purge mechanism connected to said barrel from the first purge mechanism to the second purge mechanism based on the detection results of the exhaust monitor when said exhaust volume falls below a predetermined value.

Claim 41 (New): An optical apparatus as claimed in claim 40, wherein said first gas is inert gas, and said second gas is oxygen, which has at least the same concentration as that in the atmosphere, or mixed gas, which contains oxygen.

Claim 42 (New): An optical apparatus as claimed in claim 38, wherein said optical elements is configured as part of a laser light source that emits laser light and wherein said chamber accommodates the laser light source.

Claim 43 (New): An exposure apparatus including a main body that transfers a pattern of a mask to a substrate, the exposure apparatus comprising:

- a chamber which accommodates said main body;
- a first purge mechanism provided with said main body to supply a first gas into said main body;
- a second purge mechanism provided with said main body to supply a second gas having a composition differing from the first gas into said main body;
- an exhaust apparatus connected to said chamber;
- an exhaust monitor provided with said exhaust apparatus to detect the exhaust volume of said exhaust apparatus; and

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a control apparatus connected to said first purge mechanism, said second purge mechanism and said exhaust monitor to selectively connect said main body to said first purge mechanism or said second purge mechanism based on a detection result of said exhaust monitor.

Claim 44 (New): An optical apparatus as claimed in claim 43, further comprising:
a laser source having a laser excitation portion; and
a laser chamber accommodates said laser source, wherein said exhaust apparatus is connected to said laser chamber.

Claim 45 (New): An optical apparatus as claimed in claim 43, further comprising an operation condition detecting mechanism disposed in said chamber to detect the concentration of a predetermined gas inside said chamber, wherein said control apparatus selectively connects said main body to said first purge mechanism or said second purge mechanism based on a detection result of the operation condition detecting mechanism.

Claim 46 (New): An optical apparatus as claimed in claim 45, said control apparatus switches the purge mechanism connected to said main body from the first purge mechanism to the second purge mechanism based on the detection results of the exhaust monitor when said exhaust volume falls below a predetermined value.

Claim 47 (New): An optical apparatus as claimed in claim 43, wherein said first gas is inert gas, and said second gas is oxygen, which has at least the same concentration as that in the atmosphere, or mixed gas, which contains oxygen.